

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: ) Docket No. 91221A  
Thomas Joseph Segatta et al ) Art Unit: 1301  
For: TIRE WITH APEX RUBBER ) Examiner: S Chan  
BLEND )  
Serial No. 07/945,465 )  
Filed: September 16, 1992 )

Commissioner of Patents  
and Trademarks  
Washington, D.C. 20231

SECOND DECLARATION

Dear Sir:

I, Paul Harry Sandstrom, do declare as follows:

(1) I am listed as an inventor in the above-identified patent application. I was awarded a BS degree in Chemistry from Youngstown State University in 1966 and a Master's degree in Polymer Science from The University of Akron in 1972. I have worked in the field of polymer science as my major job responsibility at The Goodyear Tire & Rubber Company for over 25 years. My current position is Section Head of Compound Technology in the Research Division of Goodyear. As a result of my work at Goodyear, I have been the named inventor or coinventor on over 62 U.S. patents.

(2) I am the same Paul Harry Sandstrom who signed the Declaration dated May 19, 1993, that was filed in the above-identified patent application.

(3) I have read U.S. Patent 5,174,838. I am the same Paul Harry Sandstrom appearing as a named inventor on this patent. This patent relates to a tire having a tread

cap and a tread base. The rubber compound used in the tread base is comprised of at least one diene rubber and a high trans 1,4-polybutadiene rubber. The rubber compound used in the tread cap is generally formulated to provide good skid resistance, tread wear and rolling resistance. The rubber compound used in the tread base is typically formulated to enhance rolling resistance and durability of the tire. The primary purpose for dividing a tread into an outer cap portion and an underlying base portion is to provide a tread base which will reduce the tire's rolling resistance. As taught in my patent (see column 1, lines 35-42), the cap/base rubber composite may be designed to improve the rolling resistance of the tire without unduly sacrificing its traction (skid resistance) or tread wear. However, such an often desirable aspect is usually difficult to obtain with a single tread compound because, for example, rolling resistance reduction is typically obtained at the expense of traction and/or tread wear. Therefore, my patent clearly teaches using a different rubber compound in the tread cap and in the tread base.

(4) I have read the Abstract to EP 410311. This Abstract teaches the use of a rubber compound of which 30 percent to 100 percent of the rubber consists of a hydrocarbon rubber containing nitrile groups. The Abstract discloses that the specific rubber compound may be used in at least the tread, sidewall, profiled core and bead. The profiled core (number 7) is the apex of the tire. The Abstract goes on to teach that the bead and/or outer cores are preferably free from phenolic resin. This implies to me that phenolic resins may be used in the tread and therefore the rubber compound for the tread is not identical to the rubber compound used in the apex aside from the common usage of the 30 percent to 100 percent of the hydrocarbon rubber containing nitrile groups. Simply because one says a rubber compound may be used in an apex of a tire does not mean that all compounds for use in an apex of a tire are equivalent in properties. In addition, I do not view the hydrocarbon rubber containing nitrile groups as a replacement for a 1,4-polybutadiene rubber or its equivalent.

(5) During my 25 years of experience in the field of polymer science, I have learned that there are hundreds of recipes for rubber compounds, each of which are typically tailored to their end use in a tire. The pneumatic tire is a complex system of interacting components, each with its own properties for maximum effectiveness; yet the

performance of the tire depends on the interactions of the components. The reason for this is because each component of the tire has its own performance requirements which must be considered when formulating the rubber compound for use in the respective component. For example, when one is formulating a rubber compound for use in a tread cap, one looks for properties that include high elongation and high tear strengths so the tire tread has higher rolling resistance and maximum cut growth resistance. When one is formulating a rubber compound for use in an apex, one looks for properties that include high stiffness and high modulus because the tire designer does not want the apex area to move to avoid delamination of the tire from the rim during use. Rubber compounds with high stiffness and high modulus would necessarily have low tear strength and low elongation values. As mentioned above, rubber compounds for tread caps would have high tear and high elongation values.

(6) I have read EP 461329. EP 461329 discloses the use of reinforced polymer blends containing micro and macro fibers in various tire components. The polymer blends are described as being useful in the tread base, tread, apex, sidewall and bead areas of tires. This reference does not disclose or suggest the use of an apex composition comprised of, based on 100 parts by weight of rubber, (a) about 80 to 97 parts by weight of at least one rubber selected from the group consisting of natural rubber, synthetic cis 1,4-polyisoprene rubber, and cis 1,4-polybutadiene rubber and (b) 3 to about 20 parts by weight of a trans 1,4-polybutadiene rubber having at least 65 percent trans 1,4-content. My invention is not the first pneumatic tire with an apex compound. I assume hundreds of compounds have been tested for use in an apex. However, two essential points need to be made. First, tread base compounds are not viewed by one skilled in the art as a drop in the slot replacement for an apex compound. Second, the reinforced compounds of EP 461329 are not equivalent, in my mind, to the compounds used in my patent 5,174,838.

(7) I have read the Abstract to Japanese Publication 1,135,847. This abstract discloses a tire containing a butadiene polymer having 70 to 90 percent of trans 1,4-bonds. The polymer may be used for tread, sidewall, belt and bead applications. This abstract does not disclose the use of trans 1,4-polybutadiene in an apex wherein the

uncured state the polybutadiene has two melting points. The abstract also does not suggest that a tread compound may be substituted for an apex compound.

(8) I have read U.S. Patent 4,824,899. This patent teaches the use of 1 to 15 parts by weight of a metal salt of acrylic acid. My invention includes use of about 3 to about 20 parts by weight of a trans 1,4-polybutadiene rubber. This reference does not suggest or disclose nor am I aware of any reference that would suggest or disclose that trans 1,4-polybutadiene is equivalent to or is a known replacement for a metal salt of acrylic acid in a rubber for use in a tire.

(9) The undersigned declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Paul Harry Sandstrom  
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Date 1-26-94